

## CLAIMS

I claim:

1. A method of reconstructing a digital image of an image on a surface using a digital image capture device arbitrarily positioned with respect to the surface, the method comprising the steps of:  
5 projecting at least three illumination marks on the surface, said illumination marks having a particular characteristic;  
capturing a single image of the surface to obtain captured image data;  
detecting pixel values corresponding to the illumination marks and their  
10 corresponding location on the surface in the captured image data dependent on the particular characteristic;  
using the location of the illumination marks in the captured image data to correct for distortion of the image and the surface in the captured image data to generate undistorted image data; and  
15 substituting estimated pixel values for the detected illumination mark pixel values in the undistorted image data, the estimated pixel values being determined using neighboring non-illumination mark pixel values.
2. The method as described in Claim 1 wherein the particular characteristic is the intensity level.
- 20 3. The method as described in Claim 1 wherein the digital image capture device is a digital camera.
4. The method as described in Claim 1 wherein the illumination marks are produced from an illumination source of a single color component having a particular intensity.

5. The method as described in Claim 4 wherein the single color illumination source is a laser.
6. The method as described in Claim 1 wherein the illumination marks are detected by detecting color component and intensity of the captured image data.
- 5 7. The method as described in Claim 1 wherein the illumination marks are detected by detecting wavelength of the captured image data.
8. The method as described in Claim 1 wherein projecting the at least two illumination marks comprises projecting a grid of illumination marks.
9. The method as described in Claim 1 wherein projecting the at least two illumination marks comprises projecting a single illumination source through a diffraction grating.
- 10 10. A system of reconstructing a digital image of an image on a surface using a digital image capture device arbitrarily positioned with respect to the surface, the method comprising the steps of:
- 15 an illumination source for projecting at least three illumination marks on the surface, said illumination marks having a particular characteristic;
- an image capturing device for capturing a single image of the surface to obtain captured image data;
- 20 an image reconstructor having means for detecting pixel values corresponding to the illumination marks and their corresponding location on the surface in the captured image data dependent on the particular characteristic, a means for using the location of the illumination marks in the captured image data to correct for distortion of the image in the captured image data to generate undistorted image data, and a means for substituting estimated pixel values determined using

neighboring non-illumination mark pixel values for the detected illumination mark pixel values.

11. The system as described in Claim 10 wherein the digital image capture device is one of a digital still camera and a digital video camera.
- 5 12. The system as described in Claim 10 wherein the illumination source is a single color component light source.
13. The system as described in Claim 10 wherein the illumination source is a laser.
14. The system as described in Claim 10 wherein the illumination marks are detected by detecting color component and intensity.
- 10 15. The system as described in Claim 10 wherein the at least three illumination marks comprise a grid of illumination marks.
16. The system as described in Claim 10 wherein the illumination source comprises a diffraction grating for projecting the illumination source through to form a grid of illumination marks.